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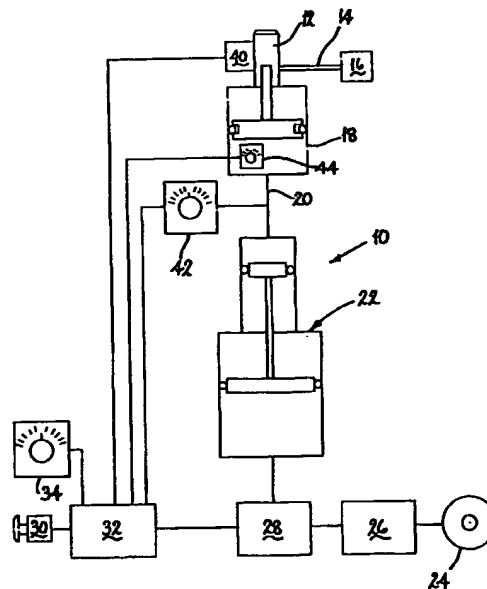
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(54) **Rivet setting tool.**

(57) A rivet setting tool where the duration of tool operation is set by the operator and the tool is operated by depressing a button. The duration of time during which the button is depressed does not effect the period of time the tool operates.



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The present invention relates to blind rivet setting tools.

A blind rivet has a tubular rivet body in which is mounted a mandrel having a head portion at the narrow end of the stem so that when the mandrel is pulled back in the rivet it upsets the rivet. This will occur when the pulling back force reaches a predetermined force which is controlled by the tool operator by holding the trigger down until this force develops. The productivity of the tool is accordingly related to the skill of the operator in knowing when the rivet is set so that the tool can be reset to receive the next rivet.

Since the tool, which is pneumatically operated, must be exhausted (the mandrel must be released) before it can again operate, productivity will also be reduced where this exhaust period is longer than the time required to feed the next rivet to the tool.

It is accordingly an object of the present invention to improve the productivity of the rivet setting tool by minimizing rivet setting time and by also minimizing the tool exhaust period.

Other objects and advantages of the present invention will become apparent from the following portion of the specification and from the accompanying drawings, which illustrate, in accordance with the mandate of the patent statutes, a presently preferred embodiment of the invention.

Referring to the drawings:

The sole figure is a block diagram of a rivet setting tool made in accordance with the teachings of the present invention.

The rivet setting tool 10 has a rivet setting head 12 which receives and sets a rivet (not shown) and releases the spent mandrel for discharge through a mandrel collection tube 14 into a collection box 16. The rivet setting head has a hydraulic operator 18 and the pressurized hydraulic fluid is supplied via a suitable conduit 20 from a pneumatically operated hydraulic intensifier 22. Details of a conventional rivet setting tool are disclosed in U.S. Patent No. 3,254,522. Air under pressure is supplied to the intensifier 22 from an air supply 24 via a pneumatic regulator 26 through a three way quick exhaust valve 28. To operate the rivet setting tool the operator will actuate the system by depressing a suitable button or actuator 30. The controller 32 will turn the power on to the three way valve to shift the three way valve to its operate position. The controller will also conjointly start the electrical timer 34 which will operate for the duration of the selected time period. The electrically operated three way pneumatic valve 22 will accordingly supply regulated air to the hydraulic intensifier 22 to operate the rivet setting head 12. When the timer 34 times out, the power to the solenoid 28 is turned off with the three way valve being

shifted to the exhaust position thereby exhausting the air within the hydraulic intensifier. The electric timer 34 has a dial for setting the time period at any duration within a selected range of times. In operation, the operator by experience or otherwise will determine the time duration that the rivet setting tool should be operated to set the rivet and will then set the electrical timer to that time. The operating time of the rivet setting tool will accordingly be independent of the time during which the button is held down and the operator need only depress the button for the rivet setting tool to operate for the desired time period. This time can also be determined by using an acceleration sensor 40 which will sense the shock associated with a ruptured mandrel or by using a hydraulic pressure sensor 42 which will sense the rapid loss of hydraulic pressure due to the rupture of the mandrel or by using a hydraulic piston displacement sensor 44 which monitors the linear displacement of the hydraulic piston of the rivet setting head (when the piston travels a predetermined amount rivet mandrel rupture is assumed). Both the hydraulic pressure sensor 42 and the hydraulic piston displacement sensor 44 can be operator varied to define the precise time representative of mandrel rupture.

Claims

1. A rivet setting tool for setting a rivet by rupturing the rivet mandrel comprising
 - a hydraulically operated rivet setting tool,
 - means for supplying hydraulic fluid under pressure to said rivet setting tool, including
 - a pneumatically operated hydraulic intensifier
 - a pneumatic regulator for supplying regulated pressurized air,
 - an electrical solenoid operated pneumatic valve for connecting the supplied regulated pressurized air to said hydraulic intensifier when operated and for exhausting air from said hydraulic intensifier when not operated,
 - means for starting the operation of said electrical solenoid and
 - means for terminating the operation of said electrical solenoid at a time corresponding to the rupture of the mandrel.
2. A rivet setting tool according to claim 1 wherein said terminating means comprises a timer and said starting means further comprises means for starting said timer means.
3. A rivet setting tool according to claim 1 wherein said terminating means comprises acceleration sensor means.

4. A rivet setting tool according to claim 1
wherein said terminating means comprises hydraulic pressure sensor means.
5. A rivet setting tool according to claim 1
wherein said terminating means comprises hydraulic piston displacement sensor means.
6. A rivet setting tool according to claim 1
wherein said terminating means further comprising means for varying said termination time.

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